REMARKS

The Examiner is thanked for the due consideration given the application. The specification has been amended to improve the headings.

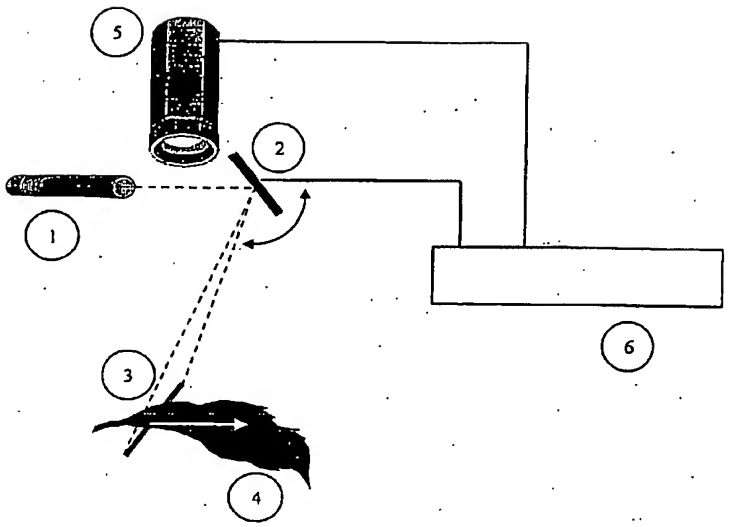
Claims 20-39 are pending in the application. Claims 29-39 have been withdrawn from consideration. Claim 20 has been amended to improve the language in a non-narrowing fashion.

No new matter is believed to be added to the application by this amendment.

Rejection Under 35 USC §103(a)

Claims 20-28 have been rejected under 35 USC §103(a) as being unpatentable over HAK et al. (Radiat Environ Biophys 1990 29:329-336) in view of SZABO et al. (Radiat Environ Biophys 1992 31:153-160). This rejection is respectfully traversed.

The present invention pertains to a method for determining the quality of plant material via chlorophyll fluorescence imaging that is illustrated, by way of example, by Figure 1 of the application, which is reproduced below.



The method of the present invention is based on recording two images, Ffast and Fslow, by using a laser line that is scanned fast and slowly over plant material, respectively. The present invention is fundamentally different from the related art in that, for obtaining the image of Ffast, the laser line is scanned several times (typically 1000 times) at high speed.

In the related art, it was not realized that a method comprising making several fast scans would yield an image that correlates with the basic fluorescence, FO. By making the slow scan (Fslow), an image is recorded that correlates with Fmax. Until the time that the invention was made, there had been no teaching or inference of the present invention as a method to make an image FO and Fmax.

HAK et al. teach that the fluorescence shows a maximum (fm), and that a steady state of the fluorescence (fs) is reached after several minutes of illumination.

The fm of HAK et al. can be analogized to the Fslow of the present invention, but HAK et al. fail to teach that assessing fm can be accomplished by slowly scanning a laser line over plant material. HAK et al. teach that a He/Ne-laser can be used to measure the induction curve and that fm and fs can be used to calculate a parameter that correlates with the potential photosynthetic activity. The fs that HAK et al. utilize is not the same as the Ffast of the present invention. The Ffast of the present invention is a summation of several hundred fast scans of the laser line at high speed. Ffast is measured in the μs-ms range, while fs is measured in the minutes range, which is a fundamentally different time scale.

SZABO et al. employ a He/Ne-laser to measure the ratio of the fluorescence at 690 and 735 nm. SZABO et al. measure this ratio by using a spectrophotometer. The spectrophotometer of SZABO et al. contains a special CCD-sensor for the measurement of the fluorescence spectrum.

SZABO et al. fail to teach that it is possible to make a fluorescence image of plant material by making several scans with a laser line and yielding an image of FO. SZABO et al. show that it is impossible to measure an FO with several scans or pulses after each other of the laser.

SZABO et al. teach that several trigger pulses in time, Figure 2 on page 156, with the result in Figure 3 on page 157 and

Figure 4 on page 158, that the fluorescence increases and yields Fm. These figures are reproduced below.

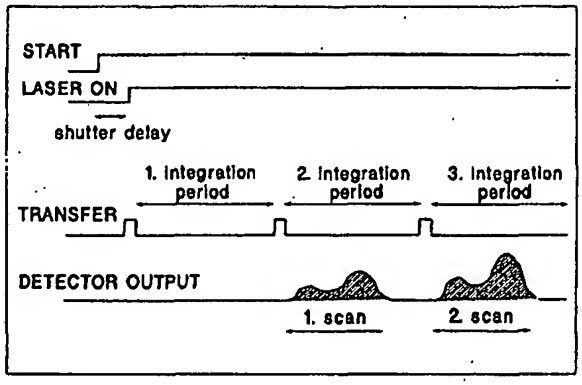


Fig. 2. Timing diagram of the CCD-OMA system. Opening of the shutter is synchronized to the detector scan. Detector scan is delayed by one integration period

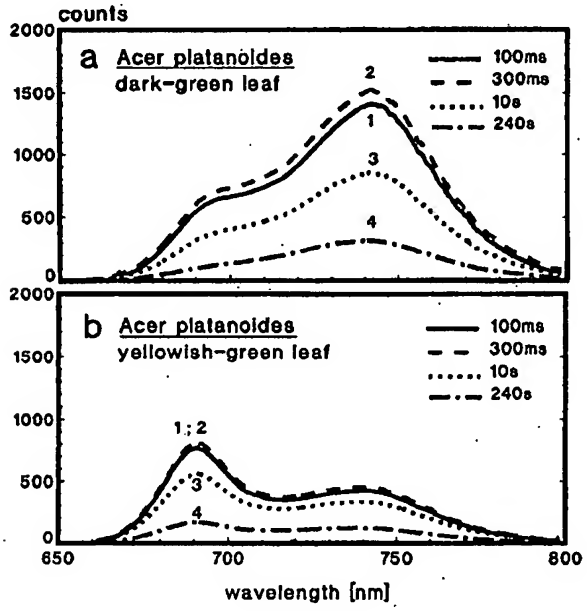


Fig. 3. Chlorophyll fluorescence emission spectra of (a) dark green and (b) yellowish-green predarkened leaves of maple (*Acer platanoides*) during the light induced chlorophyll fluorescence induction kinetics (excitation light: He/Ne laser 50000 $\mu E \cdot m^{-2} \cdot s^{-1}$, integration time: 20 ms). The spectra 1 to 4 were measured in 20 ms periods at different times of the induction kinetics as indicated. The ratio F690/F735 of both leaves is given in Table 1

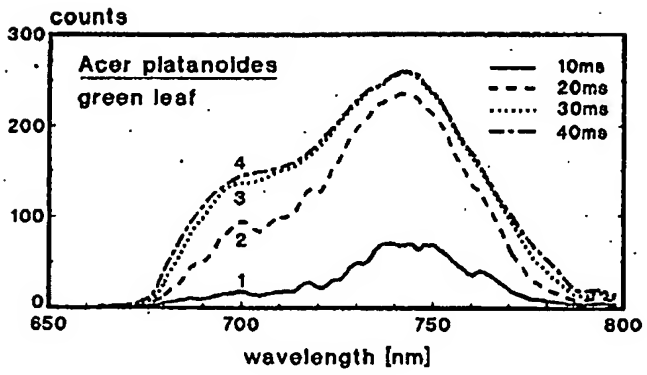


Fig. 4. Chlorophyll fluorescence spectra of a green leaf of maple (*Acer platanoides*) during the fast rise of the chlorophyll fluorescence induction kinetics (excitation light: He/Ne laser 50000$\mu E \cdot m^{-2} \cdot s^{-1}$, integration time: 10 ms). The spectra were measured in 10 ms periods at different times of the fluorescence rise induction as indicated. The ratio F690/F735 is at fm (curve 4) 0.45

SZABO et al. fail to teach that several scans or pulses from the laser will yield FO, as in the present invention. According to their result, one of ordinary skill in the art would conclude that several scans of a laser result in an image of Fmax and not an image of FO.

In contrast, the present invention utilizes "several fast scans" (independent claim 20) that are made within a certain period of time, for example, 1000 scans within 10 seconds. Making "several fast scans" obtains a sufficiently strong signal. Making "several fast scans" and measuring the chlorophyll fluorescence provide an image of "FO", i.e., the Ffast of independent claim 20 of the present invention. Further, according to the present invention, an image of Fmax, i.e., the Fslow of the present invention, is obtained by moving the laser line slowly, e.g. within 10 seconds, over the plant material.

As a result, the teachings of HAK et al. and SZABO et al. would fail to induce a person skilled in the art to measure

Ffast by making several fast scans, and Fslow, and to calculate a characteristic chlorophyll fluorescence image that is a measure of efficiency of the photosynthetic system. A *prima facie* case of unpatentability has thus not been made over claim 20 of the present invention. Claims depending upon claim 20 are patentable for at least the above reasons.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

Request for Rejoinder

Claims 29-39 have been withdrawn from consideration.

The present application is based on WO 2004/040274, which contained both method claims and device claims. The International Search Report mailed February 26, 2006 included a reference, WO 01/000333 (discussed in a prior response), which was considered in relation to both the method and device claims. As a result, unity of invention was found.

Therefore, the claims of the present invention relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the claims pertain to the same or corresponding special technical features.

Rejoinder and examination of claims 29-39 is accordingly respectfully requested.

Conclusion

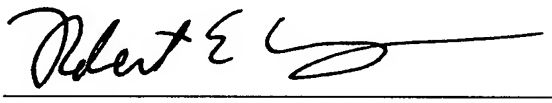
The Examiner is thanked for considering the Information Disclosure Statement filed May 2, 2005 and for making an initialed PTO-1449 Form of record in the application.

It is believed that the rejection has been overcome, obviated or rendered moot, and that no issues remain. The Examiner is accordingly respectfully requested to rejoin and allow all of the claims in the application and to issue a Notice of Allowablity.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON



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